DATA MODUL ORTUSTECH

Specification

COM101H9M36FLC

10,1" - 1280 x 800 – LVDS

Spec Revision: 0.0
Revision Date: 23.12.2024

Note: This specification is subject to change without prior notice

Passion Displayed

This product is under development and specifications are subject to change.

Specifications for
Blanview TFT-LCD Monitor (TENTATIVE)
(10.1" WVGA 1280 x RGB x 800 Landscape)
Sunlight readable TFT-LCD Monitor

Version 0.0
(Please be sure to check the specifications latest version.)

MODEL COM101H9M36FLC

Customer's Approval

Signature :

Name :

Section :

Title :

Date :

ORTUSTECH

TOPPAN INC.
Electronics Division
Technological Development Department IV

Approved by

Checked by

Prepared by

Version History

Ver.	Date	Page	Description	
0.0	2024.12.23	-	-	Tentative issue

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1. Application

This Specification is applicable to 255.85 mm (10.1 inch) Blamview TFT-LCD monitor for non-military use.

◎ TOPPAN makes no warranty or assume no liability that use of this Product and/or any information including drawings in this Specification by Purchaser is not infringing any patent or other intellectual property rights owned by third parties, and TOPPAN shall not grant to Purchaser any right to use any patent or other intellectual property rights owned by third parties. Since this Specification contains TOPPAN's confidential information and copy right, Purchaser shall use them with high degree of care to prevent any unauthorized use, disclosure, duplication, publication or dissemination of TOPPAN's confidential information and copy right.

◎ If Purchaser intends to use this Products for an application which requires higher level of reliability and/or safety in functionality and/or accuracy such as transport equipment (aircraft, train, automobile, etc.), disaster-prevention/security equipment or various safety equipment, Purchaser shall consult TOPPAN on such use in advance.

◎ This Product shall not be used for application which requires extremely higher level of reliability and/or safety such as aerospace equipment, telecommunication equipment for trunk lines, control equipment for nuclear facilities or life-support medical equipment.

◎ It must be noted as an mechanical design manner, especial attention in housing design to prevent arcuation/flexure caused by stress to the LCD module shall be considered.

◎ TOPPAN assumes no liability for any damage resulting from misuse, abuse, and/or miss-operation of the Product deviating from the operating conditions and precautions described in the Specification.

◎ It shall be mutually conferred if nonconforming defect which result from unspecified cause in this specification arises.

◎ If any issue arises as to information provided in this Specification or any other information, TOPPAN and Purchaser shall discuss them in good faith and seek solution.

◎ TOPPAN assumes no liability for defects such as electrostatic discharge failure occurred during peeling off the protective film or Purchaser's assembly process.

◎ This Product is compatible for RoHS(2.0) directive.

Object substance	Maximum content [ppm]
Cadmium and its compound	100
Hexavalent Chromium Compound	1000
Lead & Lead compound	1000
Mercury & Mercury compound	1000
Polybrominated biphenyl series（PBB series）	1000
Polybrominated biphenyl ether series（PBDE series）	1000
Bis(2-ethylhexyl)phthalate series(DEHP series)	1000
Butyl benzyl phthalate series(BBP series)	1000
Dibutyl phthalate series(DBP series)	1000
Diisobutyl phthalate series(DIBP series)	1000

2. Outline Specifications

2.1 Features of the Product

- 10.1 inch diagonal display, 1280 x RGB [H] x 800 [V] dots.
- 16.7 Million colors.
- 2.5V/8.2V voltage double power source.
- Timing generator [TG], Counter-electrode driving circuitry, Built-in power supply circuit.
- High bright white LED back-light, Built-in backlight drive circuit.
- Sunlight readable TFT-LCD Monitor (Blanview TFT-LCD, improved outdoor readability)

	Indoor		Outdoor	
	Readability	Power Efficiency (Battery Life)	Readability	Power Efficiency (Battery Life)
Transmissive	Good	Good	Average	Poor
Transflective	Average	Poor	Good	Good
Blanview	Good	Good	Excellent	Excellent

2.2 Display Method

Items	Specifications	Remarks
Display type	16.7 Million colors. Blanview, Normally black.	
Driving method	a-Si TFT Active matrix. Line-scanning, Non-interlace.	
Dot arrangement	RGB stripe arrangement.	Refer to "Dot arrangement"
Signal input method	8bit LVDS Interface.(VESA format)	
Backlight type	High bright white LED.	
NTSC ratio	(50) %	

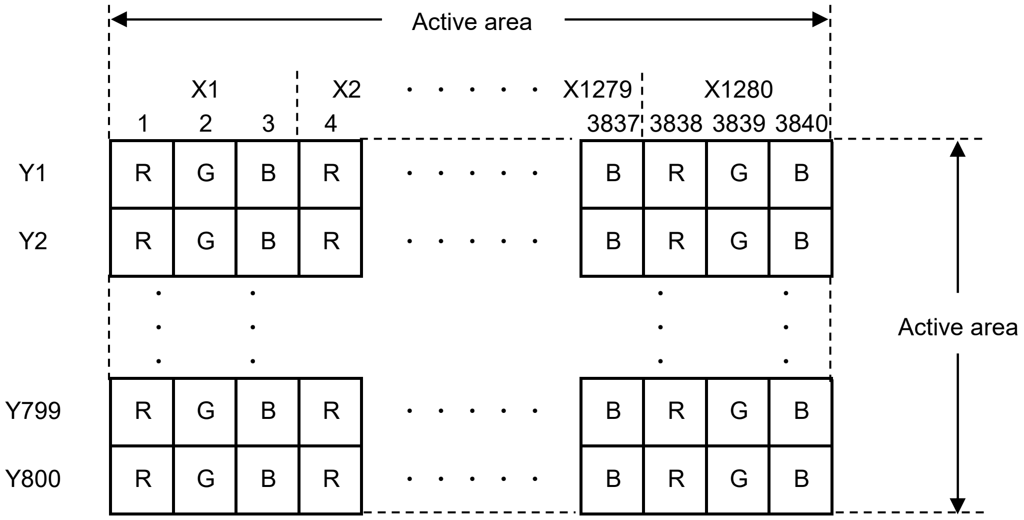
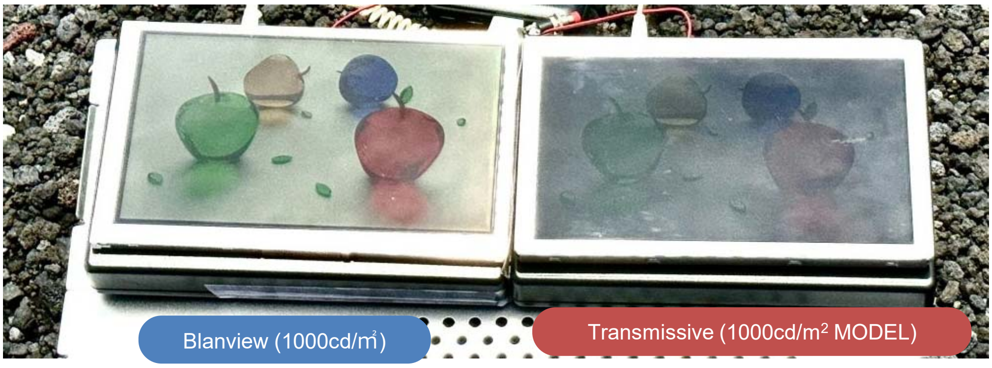


Fig.1 Dot arrangement (backside PCB placed down side)

<Features of Blanview> (A 7.0" WVGA display is shown as a typical sample)

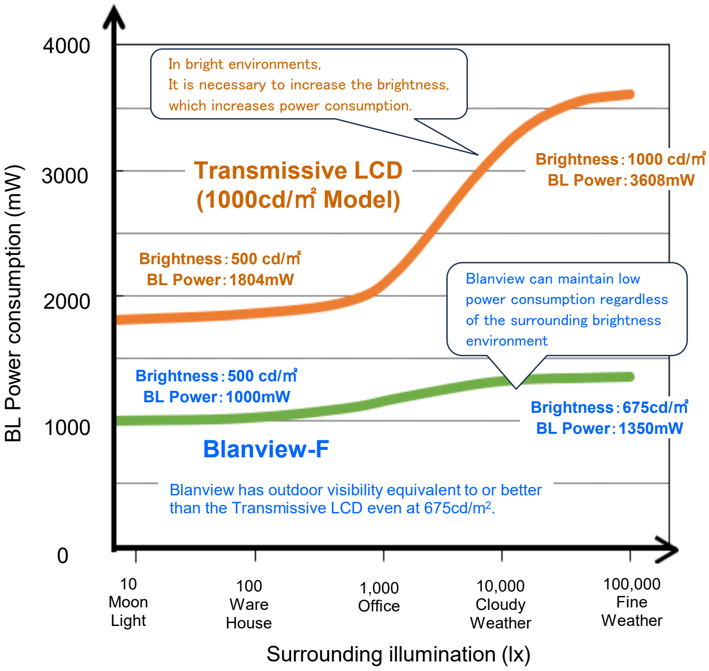
Blanview is a TFT-LCD monitor that achieves sunlight readability with low power consumption.



*Display image comparison photo outdoors (at 100,000lx)

* When compared at the same power consumption, Blanview's contrast at 100,000lx is more than two times higher than that of a transmissive LCD (1000cd/㎡ model). Blanview's contrast is 17.5, while that of a transmissive LCD is 7.5. Sunlight readability is Good with a contrast of 8 or higher on the TOPPAN index. (Contrast at 100,000lx is reference data.)

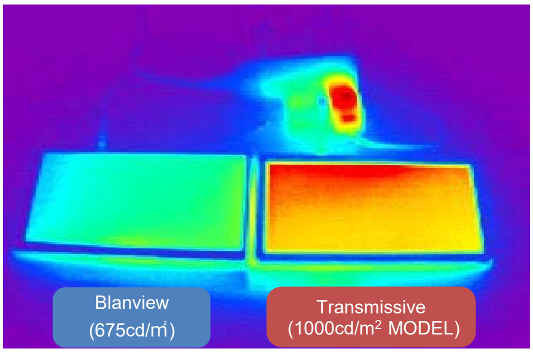
- Backlight power consumption required to assure visibility. (equivalent to 7.0"WVGA)



Sunlight Readable / BL Power comparison

	Sunlight Readable	BL Power
Transmissive LCD (1000cd/㎡ Model)	Average	Poor
Blanview-F	Excellent	Excellent

In bright environment, other companies' products require higher brightness, which increases power consumption, However TOPPAN' Blanview can maintain low power consumption without increasing brightness (visibility is not easily affected by the environment).



*Observation image with thermograph

Transmissive LCD (1000cd/m^2 MODEL) consume a lot of power, which places a large load on the customer's power circuit, causing problems such as heat generation.
Blanview has low power consumption, so it places a low load on the customer's power supply circuit and does not cause any harmful effects such as heat generation.

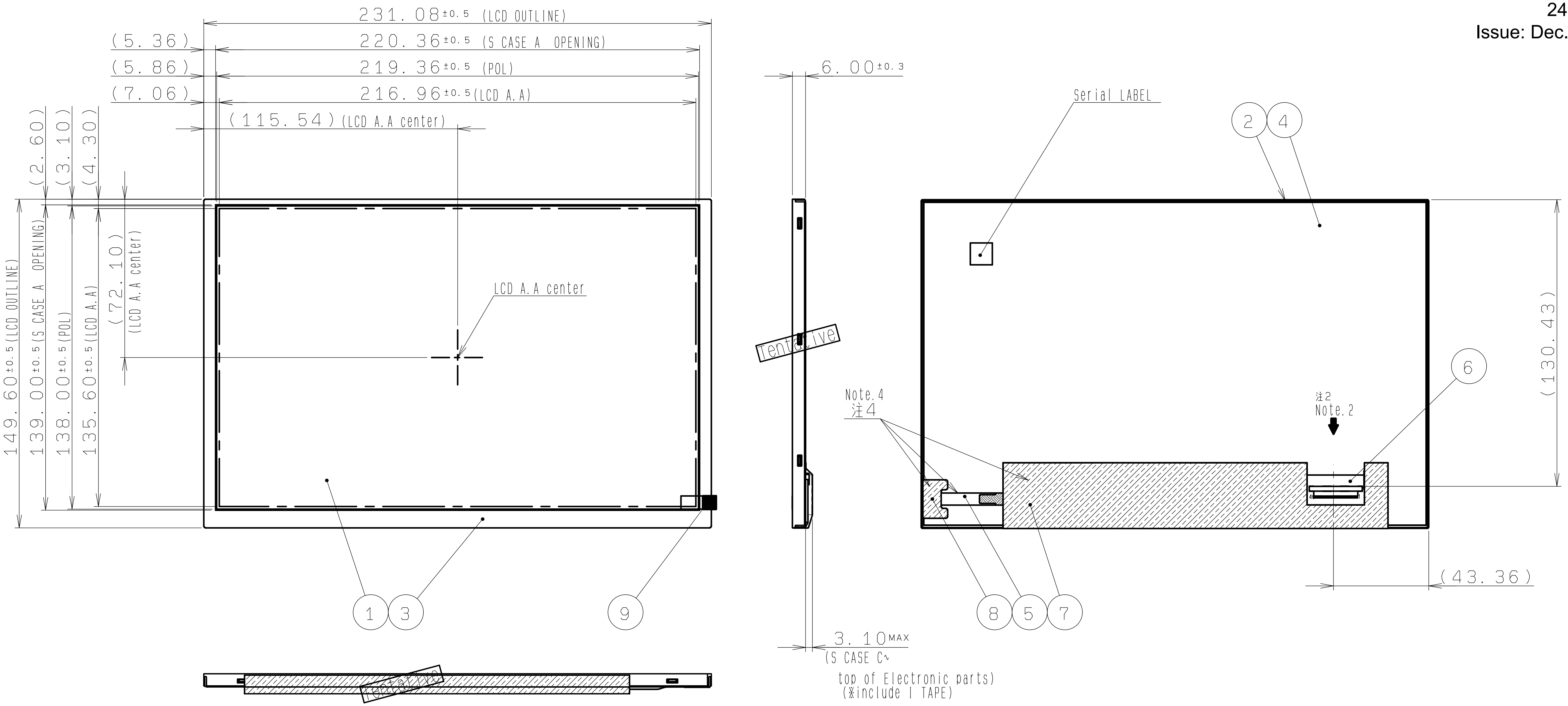
3. Dimensions and Shape

3.1 Dimensions

Items	Specifications	Unit	Remarks
Outline dimensions	(231.08) [H] × (149.6) [V] × (9.1) [D]	mm	
Active area	(216.96) [H] × (135.60) [V]	mm	Diagonal 255.85 mm
Number of dots	3840 [H]×800 [V]	dot	
Dot pitch	56.5 [H]×169.5 [V]	um	
Surface hardness of the polarizer	(T.B.D.)	H	(4.90)N
Weight	(T.B.D.)	g	

3.2 Outward Form

EC No.	REV. No.	REVISE	DATE (Y:M:D)	APPROVED	CHECKED	PREPARED
####			##:##:##	##	##	


231.08±0.5 (LCD OUTLINE)
(5.36)
220.36±0.5 (S CASE A OPENING)
(5.86)
219.36±0.5 (POL)
(7.06)
216.96±0.5 (LCD A.A)
(115.54) (LCD A.A center)
(2.60)
(3.10)
(4.30)
149.60±0.5 (LCD OUTLINE)
139.00±0.5 (S CASE A OPENING)
138.00±0.5 (POL)
135.60±0.5 (LCD A.A)
(72.10) (LCD A.A center)
LCD A.A center
① ③
⑨
6.00±0.3
Tentative
3.10MAX
(S CASE C~
top of Electronic parts)
(※include I TAPE)
Tentative
Serial LABEL
② ④
⑥
(130.43)
注2
Note.2
Note.4
注4
(43.36)
⑧ ⑤ ⑦

Tentative

The figure in this drawing and its dimensions are tentative and are subject to change.

PART NAME	ITEM	PART CODE	MODEL NUMBER	REMARK
R TAPE	9			(t=0.1)
I TAPE B	8			(t=0.08)
I TAPE A	7			(t=0.08)
PCB	6			
FPC	5			Use for LED
S CASE C	4			SUS304 t=0.3
S CASE A	3			SUS304 t=0.3
FRAME	2			PC
TFT-LCD PANEL	1			Glass substrate thickness 0.4t+0.4t

注 1. 搭載コネクタ：196415-40041-36(P-TWO)
注 2. 矢印の方向よりFPCを挿入してください。
注 3. 製品表面に保護フィルムが貼られます。
保護フィルムは製品外形からはみ出さないものとします。
注 4. I TAPE部に電子部品およびFPCが存在しております。強く押さないでください。
表示に不具合が生じる可能性が有ります。

Note: 1. Mounted Connector:196415-40041-36(P-TWO)
Note: 2. Insert the FPC from the direction of the arrow.
Note: 3. Protective film is affixed on front surface of the screen.
Protective film is not protrude from the outline of the monitor.
Note: 4. Do not press too hard on the I TAPE area,
as electronic components and FPCs are present there.

APPROVED 木下大輔	GENERAL TOLERANCE ±1.0	SCALE 1/2	UNIT mm
CHECKED 加藤真一	ISSUE (Y:M:D) 24:11:1	MODEL COM101H9M36F※※	
CHECKED	NAME OUTLINE-G9M36		
DESIGN 富田恵太			
DRAW 富田恵太			

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DRAWING No.	REV.	SHEET	DIV.
SJD605457D301	#	/	

ASS'Y

3.3 Serial Label (S-Label)

TBD

4. Pin Assignment

№	Symbol	Function
1	NC	No connection
2	VDD	Power Supply
3	VDD	Power Supply
4	NC	No connection
5	NC	No connection
6	NC	No connection
7	GND	Ground
8	Rxin0-	-LVDS Differential Data Input(R0-R5,G0)
9	Rxin0+	+LVDS Differential Data Input(R0-R5,G0)
10	GND	Ground
11	Rxin1-	-LVDS Differential Data Input(G1-G5,B0,B1)
12	Rxin1+	+LVDS Differential Data Input(G1-G5,B0,B1)
13	GND	Ground
14	Rxin2-	-LVDS Differential Data Input(B2-B5,HS,VS,DE)
15	Rxin2+	+LVDS Differential Data Input(B2-B5,HS,VS,DE)
16	GND	Ground
17	RxCLK-	-LVDS Differential Data Input
18	RxCLK+	+LVDS Differential Data Input
19	GND	Ground
20	Rxin3-	-LVDS Differential Data Input
21	Rxin3+	+LVDS Differential Data Input
22	GND	Ground
23	NC	No connection
24	NC	No connection
25	GND	Ground
26	NC	No connection
27	NC	No connection
28	NC	No connection
29	AVDD	Power for Analog Circuit
30	GND	Ground
31	NC	No connection
32	NC	No connection
33	K1	LED Cathode
34	K2	LED Cathode
35	K3	LED Cathode
36	K4	LED Cathode
37	K5	LED Cathode
38	K6	LED Cathode
39	LED+	LED Anode
40	LED+	LED Anode

- Recommended connector : P-TWO [196415-40041-36]
- Please make sure to check a consistency between pin assignment in "3.2 Outward Form" and your connector pin assignment when designing your circuit.
  Inconsistency in input signal assignment may cause a malfunction.
- NC terminal should be open, Do not conect anything.
- The terminals of the installed connector are gold plated. Using gold-plated FFC/FPC terminals is recommended.

5. Absolute Maximum Rating

GND=0V

Item	Symbol	Rating		Unit	Applicable terminal
		MIN	MAX		
LCD Supply Voltage	VCC	-0.3	3.9	V	VDD
Backlight Forward current	IL	-	325	mA	LED+ - K1,K2,K3 K4,K5,K6
Storage temperature range	Tstg	(-40)	(85)	°C	Limit storage time can not exceed 7 days
Storage humidity range	Hst	10	90	%RH	Limit storage time can not exceed 7 days

6. Recommended Operating Conditions

GND=0V

Item	Symbol	Condition	Rating			Unit	Applicable terminal
			MIN	TYP	MAX		
Supply voltage for Logic	VDD		2.3	2.5	3.5	V	VDD
Supply voltage for Analog	AVDD		5.0	8.2	12.0	V	AVDD
Operational temperature range	Top	Note1	(-30)	+25	(+85)	°C	Limit storage time can not exceed 7 days
Operational humidity range	Hop		10		90	%RH	Limit storage time can not exceed 7 days

Note1: This monitor is operatable in this temperature range. With regard to optical characteristics, refer to Item 9."Characteristics".

7. Electrical Characteristics

7.1 DC Characteristics

(Unless otherwise noted, Ta=25 °C,VDD=2.5V,AVDD=8.2V,GND=0V)

Item	Symbol	Condition	Rating			Unit	Applicable terminal
			MIN	TYP	MAX		
Operating current of Logic	IDD	Color bars fclk=(71.1MHz)	-	T.B.D.	T.B.D.	mA	VDD
Operating current for Analog	AIDD		-	T.B.D.	T.B.D.	mA	AVDD

(Backlight)

Item	Symbol	Condition	Rating			Unit	Applicable terminal
			MIN	TYP	MAX		
Forward current	IL	Ta=25 °C	-	(40.0)	(54.0)	mA	LED+ - K1,K2,K3 K4,K5,K6
Forward voltage *Reference value	VF	Ta=25 °C IL=(40.0)mA	-	(T.B.D.)	(T.B.D.)	V	LED+ - K1,K2,K3 K4,K5,K6
Estimated Life of LED Note	LL	Ta=25 °C IL=(40.0)mA	--	(70,000)	--	hrs	

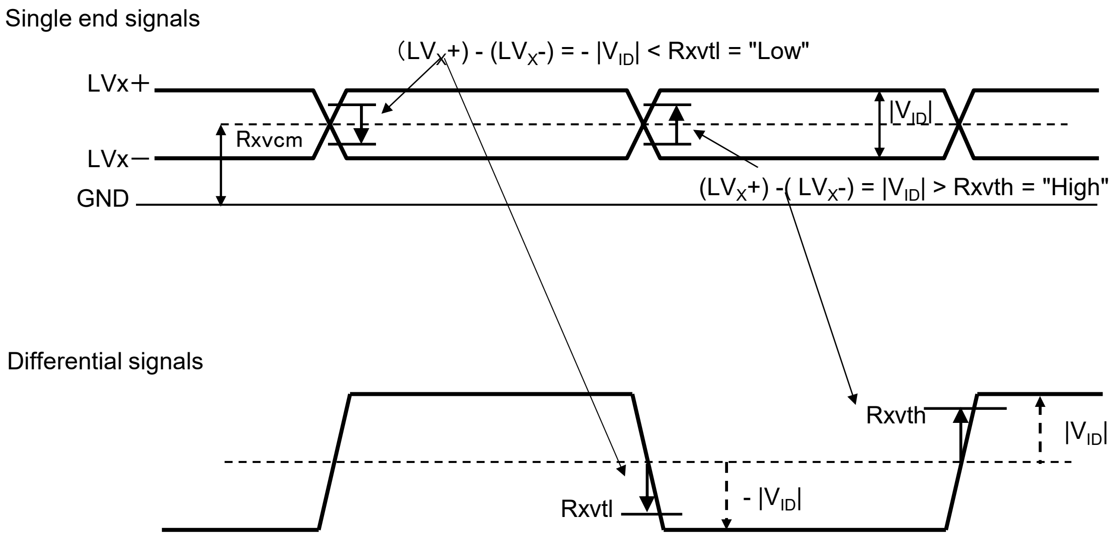
Note:
- The lifetime of the LED is defined as a period till the brightness of the LED decreases to the half of its initial value.
- This figure is given as a reference purpose only, and not as a guarantee.
- This figure is estimated for an LED operating alone.
  As the performance of an LED may differ when assembled as a monitor.
- Estimated lifetime could vary on a different temperature and usually higher temperature could reduce the life significantly.
  As the performance of an LED may differ when assembled as a monitor.
- Estimated lifetime could vary on a different temperature and usually higher temperature could reduce the life significantly.

7.2 LVDS Interface

7.2.1 LVDS DC Characteristics

(Unless otherwise noted, Ta=25 °C,VCC=2.5V,AVDD=8.2V,GND=0V)

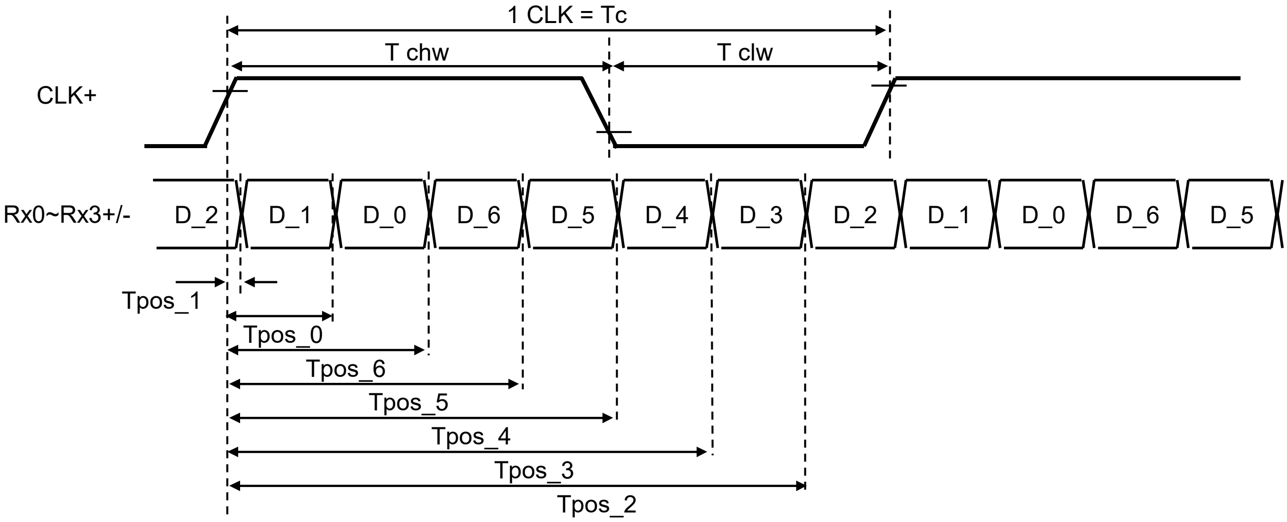
Item	Symbol	Condition	Rating			Unit	Applicable terminal
			MIN	TYP	MAX		
Differential input high threshold	Rxvth	R_{XVCM}=1.2V	-	-	0.1	V	RxCLK- ,RxCLK+ Rxin0- ,Rxin0+ Rxin1- ,Rxin1+ Rxin2- ,Rxin2+ Rxin3- ,Rxin3+
Differential input low threshold	Rxvtl		-0.1	-	-	V	
Differential input Common-mode voltage	Rxvcm		0.7	-	1.6	V	
Differential input voltage	$\lvert V_{ID} \rvert$		0.2		0.6	V	


Single end signals
(LVX+) - (LVX-) = - |VID| < Rxvtl = "Low"
LVx+
LVx−
GND
Rxvcm
|VID|
(LVX+) -(LVX-) = |VID| > Rxvth = "High"
Differential signals
Rxvth
|VID|
Rxvtl
- |VID|

7.2.2 LVDS AC Characteristics

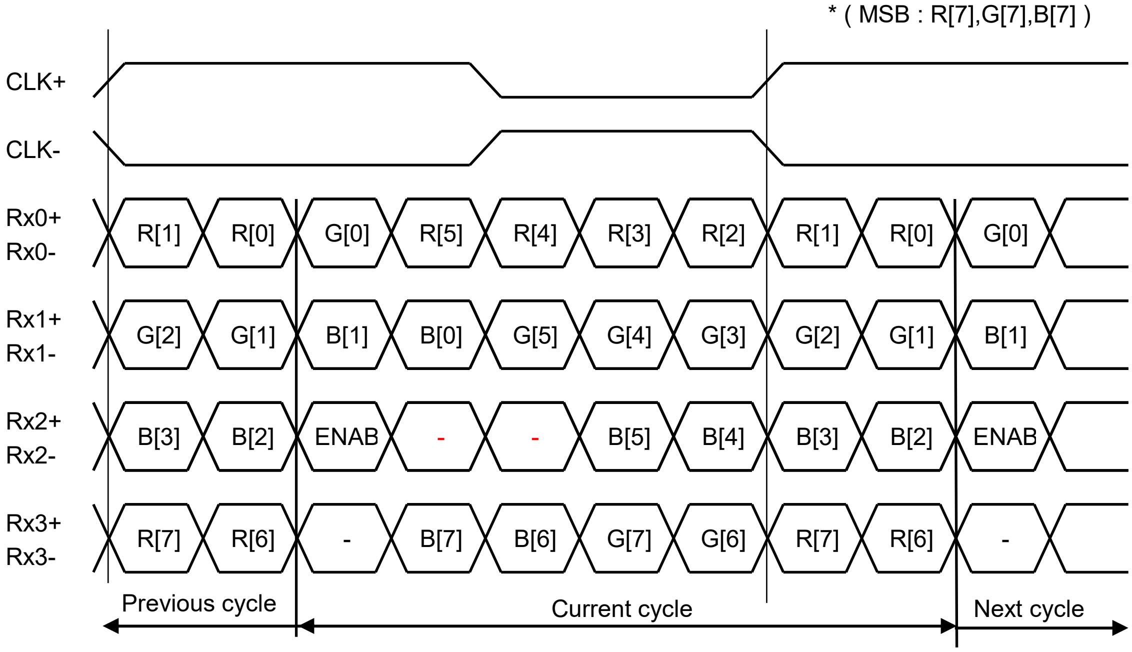
(Unless otherwise noted, Ta=25 °C,VCC=2.5V,AVDD=8.2V,GND=0V)

Item	Symbol	Rating			Unit	
		MIN	TYP	MAX		
CLK Frequency	f clk	69.7		80.9	MHz	
Clock period	Tc	12.36	-	14.3	ns	
1 data bit time	UI	-	1/7	-	Tc	
CLK High level Width	T chw	3.9	4	4.1	UI	
CLK Low level Width	T clw	2.9	3	3.1	UI	
Position 1	Tpos_1	-0.2	0	0.2	UI	
Position 0	Tpos_0	0.8	1	1.2	UI	
Position 6	Tpos_6	1.8	2	2.2	UI	
Position 5	Tpos_5	2.8	3	3.2	UI	
Position 4	Tpos_4	3.8	4	4.2	UI	
Position 3	Tpos_3	4.8	5	5.2	UI	
Position 2	Tpos_2	5.8	6	6.2	UI	
PLL wake-up time	TenPLL	0.6	-	-	us	


1 CLK = Tc
T chw
T clw
CLK+
Rx0~Rx3+/-
D_2
D_1
D_0
D_6
D_5
D_4
D_3
D_2
D_1
D_0
D_6
D_5
Tpos_1
Tpos_0
Tpos_6
Tpos_5
Tpos_4
Tpos_3
Tpos_2

7.2.3 Input Data Format

VESA Format 8bit

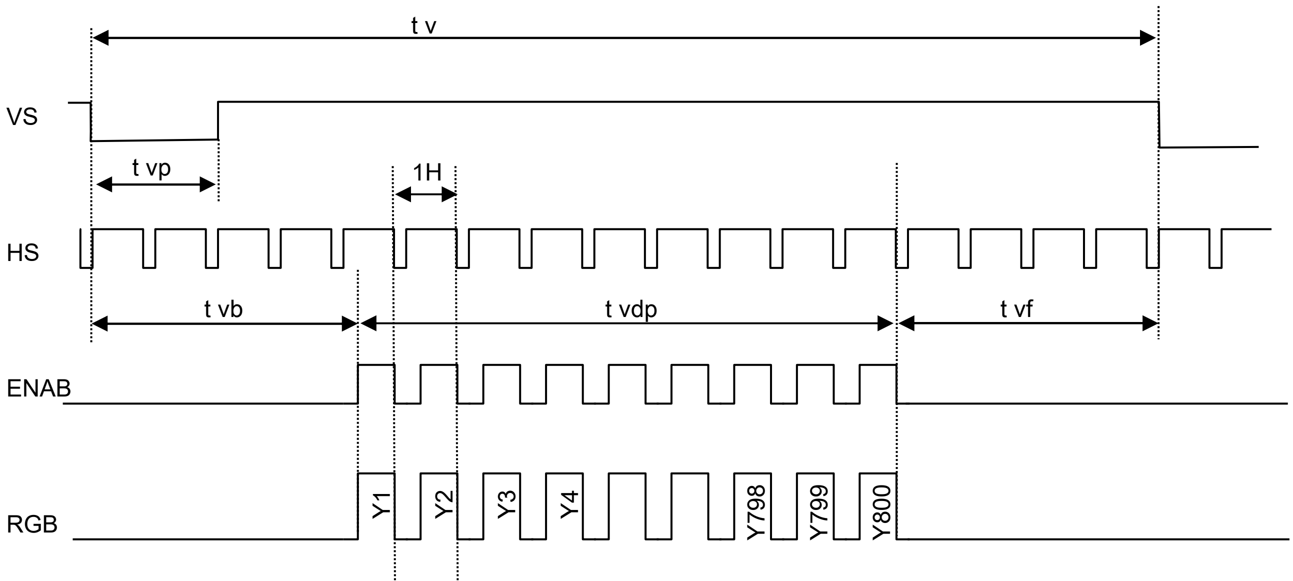

* (MSB : R[7],G[7],B[7])
CLK+
CLK-
Rx0+
Rx0-
R[1]
R[0]
G[0]
R[5]
R[4]
R[3]
R[2]
R[1]
R[0]
G[0]
Rx1+
Rx1-
G[2]
G[1]
B[1]
B[0]
G[5]
G[4]
G[3]
G[2]
G[1]
B[1]
Rx2+
Rx2-
B[3]
B[2]
ENAB
-
-
B[5]
B[4]
B[3]
B[2]
ENAB
Rx3+
Rx3-
R[7]
R[6]
-
B[7]
B[6]
G[7]
G[6]
R[7]
R[6]
-
Previous cycle
Current cycle
Next cycle

7.3 Input Timing Specifications

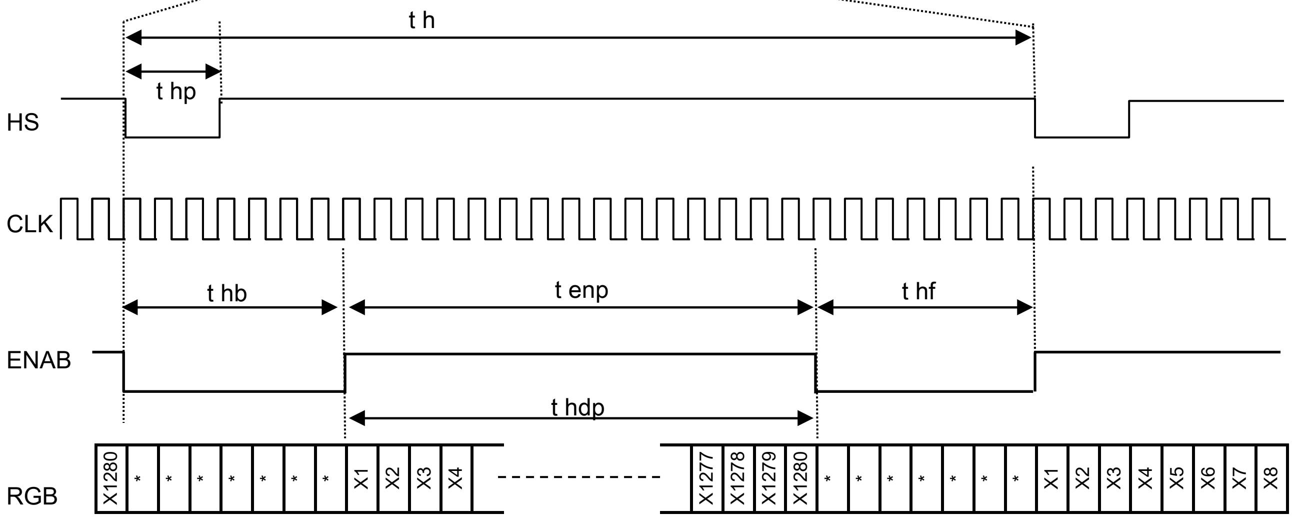
ITEM	Symbol	Rating			Unit	Signal
		MIN	TYP	MAX		
CLK frequency	fCLK	68.9	71.1	73.4	MHz	
1 vertical field	tv	815	823	833	H	
VS blanking time	tbl	15	23	33	H	tbl=tvb+tvf
Vertical valid data	tvdp	800			H	
1 horizontal field	th	1410	1440	1470	CLK	
HS blanking time	hbl	130	160	190	CLK	hbl=thb+thf
ENAB pulse width	tenp	1280			CLK	
Horizontal valid data	thdp	1280			CLK	

(*) Input terminals are (Rxin0+/- , Rxin1+/- , Rxin2+/- , Rxin3+/- , RxCLK+/-)

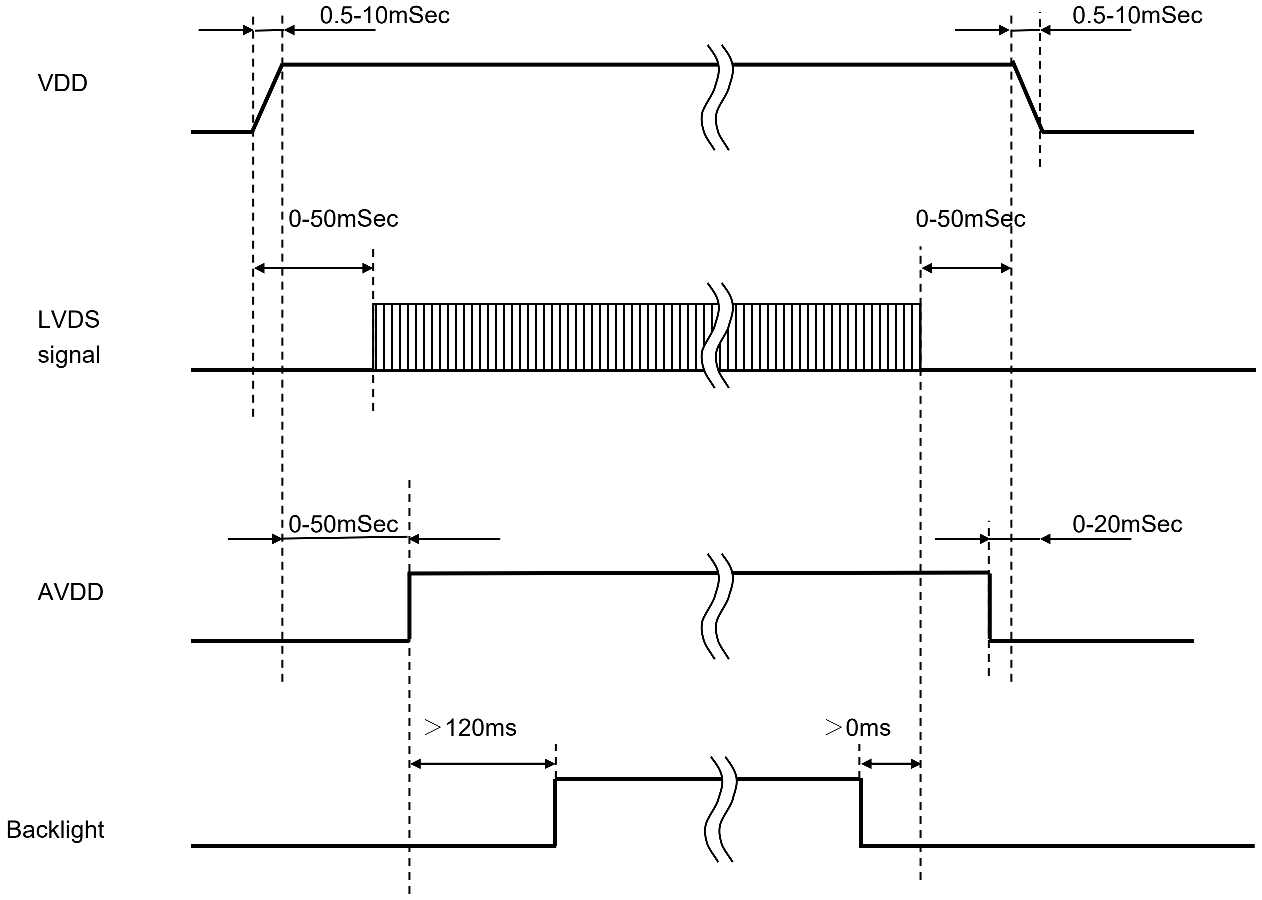
<Vertical timing>


t v
VS
t vp
1H
HS
t vb
t vdp
t vf
ENAB
RGB
Y1
Y2
Y3
Y4
Y798
Y799
Y800

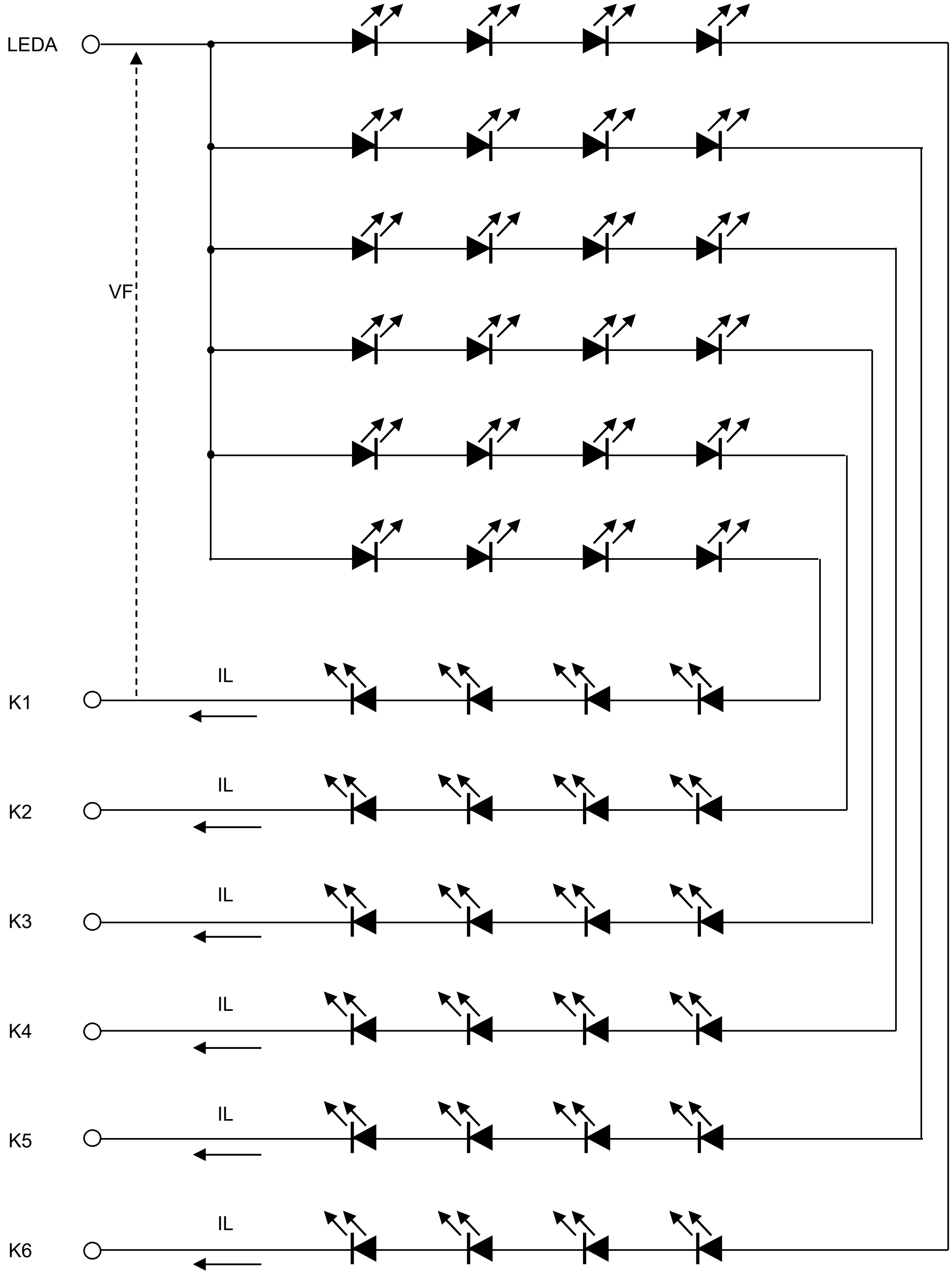
<Horizontal timing>


t h
t hp
HS
CLK
t hb
t enp
t hf
ENAB
t hdp
RGB
X1280
*
X1
X2
X3
X4
X1277
X1278
X1279
X1280
X5
X6
X7
X8

7.4 Power ON/OFF Sequence


0.5-10mSec
0.5-10mSec
VDD
0-50mSec
0-50mSec
LVDS
signal
0-50mSec
0-20mSec
AVDD
＞120ms
＞0ms
Backlight

8. LED Circuit


LEDA
VF
IL
K1
IL
K2
IL
K3
IL
K4
IL
K5
IL
K6

9. Characteristics

9.1 Optical Characteristics

(Measurement Condition)
Measuring instruments: CS2000 (KONICA MINOLTA), RD-80SA (TOPCON), EZcontrastXL88 (ELDIM)
Driving condition: VDD=2.5V,AVDD=8.2V,GND=0V, Optimized VCOMDC
Backlight: IL= (40.0) mA (Applicable terminal : LED+ - K1,K2,K3,K4,K5,K6)
Measured temperature: Ta = 25°C

Item		Symbol	Condition	MIN	TYP	MAX	Unit	Note №	Remark
Response time	Rise time + Fall time	TON + TOFF	[Data]= 00h← → FFh	-	-	（100）	ms	1	
Contrast ratio		CR	[Data]= FFh / 00h	(800)	(1000)	-		2	
Viewing angle	Left	θL	[Data]= FFh / 00h CR ≧ (10)	(70)	(80)	-	deg	3	
	Right	θR		(70)	(80)	-	deg		
	Up	φU		(70)	(80)	-	deg		
	Down	φD		(70)	(80)	-	deg		
White Chromaticity		x	[Data]= FFh	(TBD)	(TBD)	(TBD)		4	
		y		(TBD)	(TBD)	(TBD)			
Center Brightness			[Data]= FFh	(800)	(1000)	-	cd/㎡	5	
Brightness distribution			[Data]= FFh	（75）	-	-	%	6	

* Note number 1 to 6: Refer to the APPENDIX of "Reference Method for Measuring Optical Characteristics and Performance".

9.2 About Sunlight readable

Item	Illuminance	Display visibility	Remarks
Sunlight readable	100,000 lx	Possible	Refer to **<Features of Blanview>**

10. Criteria of Judgment

10.1 Defective Display and Screen Quality

TBD

10.2 Screen and Other Appearance

TBD

11. Reliability Test

Test item		Test condition			number of failures / number of examinations
Durability test	High temperature storage	Ta = (85)°C	240hrs		TBD
	Low temperature storage	Ta = (-40)°C	240hrs		TBD
	High temperature & high humidity storage	Ta = 60°C, RH = 90%, non condensing	240hrs	※	TBD
	High temperature operation	Tp = (85)°C	240hrs		TBD
	Low temperature operation	Tp = (-30)°C	240hrs		TBD

Note:Ta=ambient temperature Tp=Panel temperature

※ The profile of high temperature/humidity storage。
(Pure water of over 10MΩ·cm shall be used.)

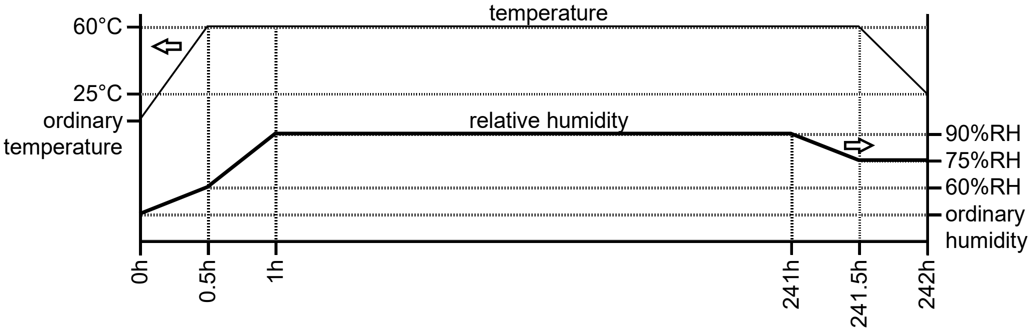


Table2. Reliability Criteria

The parameters should be measured after leaving the monitor at the ordinary temperature for 24 hours or more after the test completion.

Item	Standard	Remark
Display quality	No visible abnormality shall be seen. (Except for unevenness by Pol deterioration.)	
Contrast ratio	200 or more	Backlight ON

12. Packing Specifications

TBD

13. Handling Instruction

13.1 Cautions for Handling LCD panels

⚠ **Caution**

(1) Do not make an impact on the LCD panel glass because it may break and you may get injured from it.

(2) If the glass breaks, do not touch it with bare hands.
（Fragment of broken glass may stick you or you cut yourself on it.

(3) If you get injured, receive adequate first aid and consult a medial doctor.

(4) Do not let liquid crystal get into your mouth.
（If the LCD panel glass breaks, try not let liquid crystal get into your mouth even toxic property of liquid crystal has not been confirmed.)

(5) If liquid crystal adheres, rinse it out thoroughly.
（If liquid crystal adheres to your cloth or skin, wipe it off with rubbing alcohol or wash it thoroughly with soap.
If liquid crystal gets into eyes, rinse it with clean water for at least 15 minutes and consult an eye doctor.

(6) If you scrap this products, follow a disposal standard of industrial waste that is legally valid in the community, country or territory where you reside.

(7) Do not connect or disconnect this product while its application products is powered on.

(8) Do not attempt to disassemble or modify this product as it is precision component.

(9) If a part of soldering part has been exposed, and avoid contact (short-circuit) with a metallic part of the case etc. about Circuit board of this model, please.
Please insulate it with the insulating tape etc. if necessary.
The defective operation is caused, and there is a possibility to generation of heat and the ignition.

(10) For protection your circuit, we recommend you to add excess current protection circuit to power supply.

Caution

⚠ **This mark is used to indicate a precaution or an instruction which, if not correctly observed, may result in bodily injury, or material damages alone.**

13.2 Precautions for Handling

1) Wear finger tips at incoming inspection and for handling the TFT monitors to keep display quality and keep the working area clean.
Do not touch the surface of the monitor as it is easily scratched.

2) Wear grounded wrist-straps and use electrostatic neutralization blowers to prevent static charge and discharge when handling the TFT monitors as the LED in this TFT monitors is damageable to electrostatic discharge.
Designate an appropriate operating area, and set equipment, tools, and machines properly when handling this product.

3) Avoid strong mechanical shock including knocking, hitting or dropping to the TFT monitors for protecting their glass parts.
Do not use the TFT monitors that have been experienced dropping or strong mechanical shock.

4) Do not use or storage the TFT monitors at high temperature and high humidity environment.
Particularly, never use or storage the TFT monitors at a location where condensation builds up.

5) Avoid using and storing TFT monitors at a location where they are exposed to direct sunlight or ultraviolet rays to prevent the LCD panels from deterioration by ultraviolet rays.

6) Do not stain or damage the contacts of the Connector
FPC cable needs to be inserted until it can reach to the end of connector slot.
During insertion, make sure to keep the cable in a horizontal position to avoid an oblique insertion.
Otherwise, it may cause poor contact or deteriorate reliability of the Connector.

7) Peel off the protective film on the TFT monitors during mounting process.
Refer to the section 13.5 on how to peel off the protective film.
We are not responsible for electrostatic discharge failures or other defects occur when peeling off the protective film.

13.3 Precautions for Operation

1) Since this TFT monitors are not equipped with light shielding for the driver IC,
do not expose the driver IC to strong lights during operation as it may cause functional failures.

2) In case of powering up or powering off this LCD module,
be sure to comply the sequence as instructed in this specification.

3) Do not plug in or out the FPC cable while power supply is switch on.
Plug the FPC cable in and out while power supply is switched off.

4) Do not operate the TFT monitors in the strong magnetic field. It may break the TFT monitors.

5) Do not display a fixed image on the screen for a long time.
Use a screen-saver or other measures to avoid a fixed image displayed on the screen for a long time.
Otherwise, it may cause burn-in image on the screen due the characteristics of liquid crystal.

13.4 Storage Condition for Shipping Cartons

(Storage environment)

・ Temperature	0 to 40˚C
・ Humidity	60%RH or less No-condensing occurs under low temperature with high humidity condition.
・ Atmosphere	No poisonous gas that can erode electronic components and/or wiring materials should be detected.
・ Time period	1 year
・ Unpacking	To prevent damages caused by static electricity, anti-static precautionary measures (e.g. earthing, anti-static mat) should be implemented. After unpack, keep product in the appropriate condition, otherwise bubble seal of Protective film may be printed on Polarizer.
・ Maximum piling up	(8) cartons

*Conditions to storage after unpacking

(Storage environment)

・ Temperature	0 to 40˚C
・ Humidity	60%RH or less No-condensing occurs under low temperature with high humidity condition.
・ Atmosphere	No poisonous gas that can erode electronic components and/or wiring materials should be detected.
・ Time period	1 year (Shelf life)
・ Others	Keep/ store away from direct sunlight Storage goods on original tray made by TOPPAN.

13.5 Precautions for Peeling off the Protective film

The followings work environment and work method are recommended to prevent the TFT monitors from static damage or adhesion of dust when peeling off the protective films.

A) Work Environment
  a) Humidity: 50 to 70 %RH, Temperature15 to 27˚C
  b) Operators should wear conductive shoes, conductive clothes, conductive finger tips and grounded wrist-straps. Use an electrostatic neutralization blower.
  c) Anti-static treatment should be implemented to work area's floor. Use a room shielded against outside dust with sticky floor mat laid at the entrance to eliminate dirt.

B) Work Method

TBD

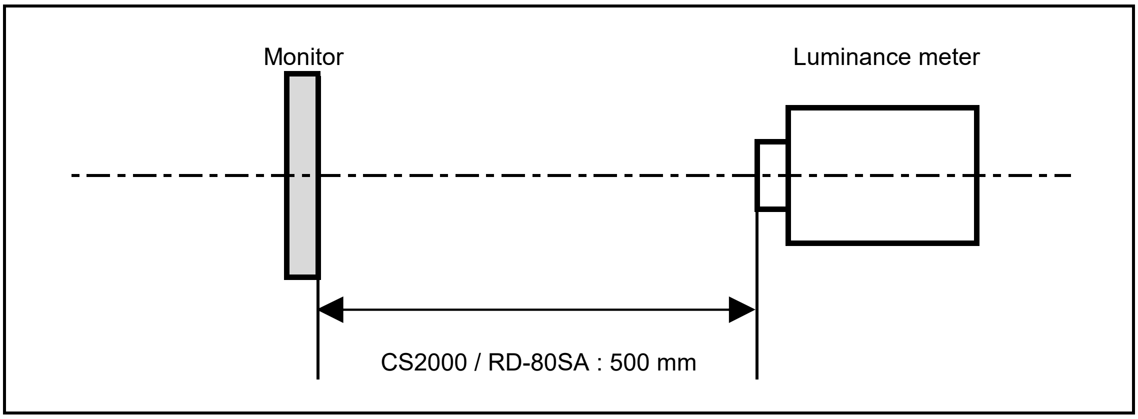
APPENDIX

Reference Method for Measuring Optical Characteristics and Performance

1. Measurement Condition

Measuring instruments: CS2000（KONICA MINOLTA）, RD-80SA(TOPCON）,EZcontrastXL88（ELDIM）
Driving condition: Refer to the section "Optical Characteristics"
Measured temperature: 25°C unless specified
Measurement system: See the chart below. The luminance meter is placed on the normal line of measurement system.
Measurement point: At the center of the screen unless otherwise specified

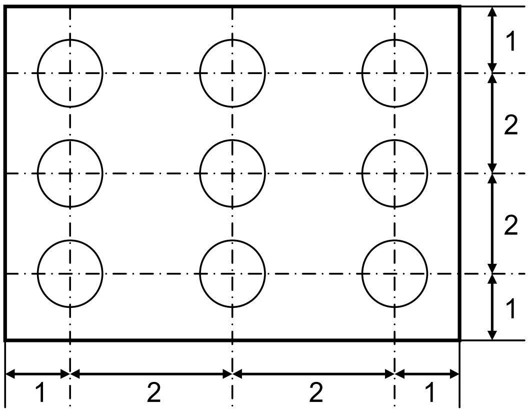
Dark box at constant temperature



*Measurement is made after 30 minutes of lighting of the backlight.

Measurement point: At the center point of the screen
Brightness distribution: 9 points shown in the following drawing.

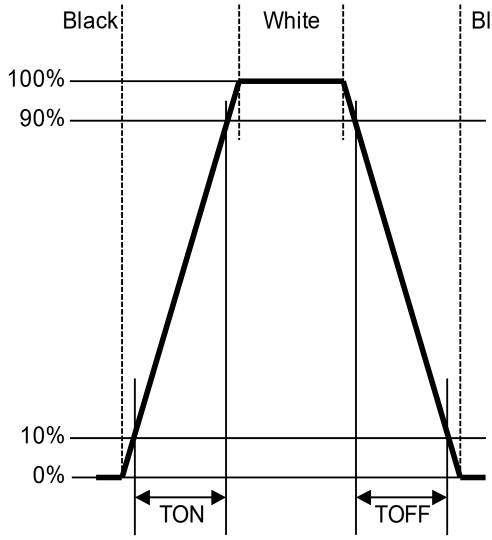
<Landscape model>



Dimensional ratio of active area

Backlight IL= (40.0) mA (Applicable terminal : LED+ - K1,K2,K3,K4,K5,K6)

2. Test Method

Notice	Item	Test method	Measuring instrument	Remark
1	Response time	Measure output signal waveform by the luminance meter when raster of window pattern is changed from white to black and from black to white.  Black White Black 100% 90% 10% 0% TON TOFF	RD-80SA	Black display [Data]=00h White display [Data]=FFh TON Rise time TOFF Fall time
2	Contrast ratio	Measure maximum luminance Y1([Data]=FFh) and minimum luminance Y2([Data]=00h) at the center of the screen by displaying raster or window pattern. Then calculate the ratio between these two values. Contrast ratio = Y1/Y2 Diameter of measuring point: 7.8mmφ(CS2000)	CS2000	
3	Viewing angle Horizontalθ Verticalφ	Move the luminance meter from right to left and up and down and determine the angles where contrast ratio is (10).	EZcontrastXL88	
4	White chromaticity	Measure chromaticity coordinates x and y of CIE1931 colorimetric system at [Data] = FFh Color matching function: 2°view measurement angle: 1°	CS2000	
5	Center brightness	Measure the brightness at the center of the screen.	CS2000	
6	Brightness distribution	(Brightness distribution) = 100 x B/A % A : max. brightness of the 9 points B : min. brightness of the 9 points	CS2000	

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